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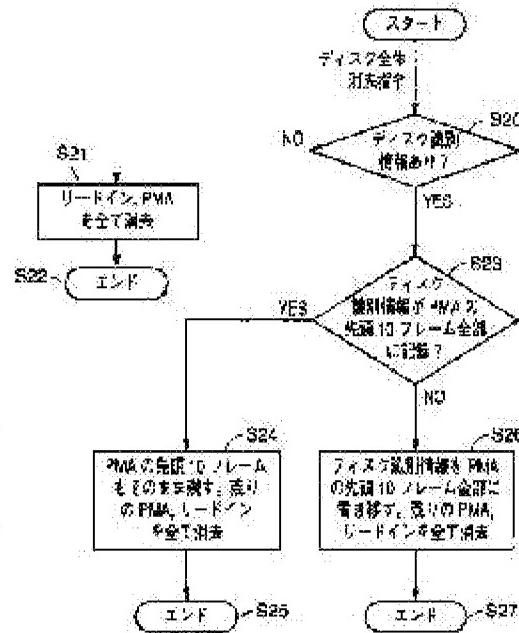
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(54) METHOD FOR ERASING CD-RW DISK AND CD-RW RECORDER

(57)Abstract:

PROBLEM TO BE SOLVED: To utilize information on individual disks such as OPC parameters stored in a host computer even after the contents of a CD-RW disk have been erased.

SOLUTION: In a PMA area of a CD-RW a frame having information on disk identification information in a proper location and frames having information on tracks recorded in a program area are recorded, respectively. When an instruction is given to erase the whole disk, the frame having the identification information is stored at the head of the PMA, and all the frames having the track information of the PMA are erased. When an instruction to erase the last track is given to the PMA concerning the CD-RW where the disk identification information is recorded following the information on the last track, the information on the last track is erased by being overwritten by the disk identification information. The disk information at the original location is erased.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]**[0001]**

[Field of the Invention]this invention about the CD-RW recorder which enforces the erasing method and this erasing method of a CD-RW (CD -- rewritable) disk, Even after erasing processing of this CD-RW disk is carried out, it enables it to use the information about each CD-RW disk memorized by the host computer to which the CD-RW recorder itself or a CD-RW recorder is connected.

[0002]

[Description of the Prior Art]The erasing method of a CD-RW disk has physical elimination and logic elimination. By tracing a track by the laser beam of an erasing level, physical elimination is an erasing method which erases a pit and is returned to the state where it does not record of origin. Logic elimination is an erasing method which overwrites the data of the logic 0. Per elimination of a CD-RW disk, there are elimination of an entire disk and elimination of a final track. When eliminating an entire disk by logic elimination, logic elimination of the whole (when FAINA rise processing is carried out, they are the whole PMA area and the whole lead-in groove field) PMA area (Program Memory Area) is carried out. Since the TOC (Table of Contents) information, including the number of each track (if it is an audio music), position information, etc., recorded on the program area of the CD-RW disk is recorded on the PMA area and the lead-in groove field, By carrying out logic elimination of these whole fields, a CD-RW recorder judges this CD-RW disk to have no recorded track, and can overwrite a new track now from the starting position of a program area. About the CD-RW (that is, lead-in groove field is not recorded) disk by which FAINA rise processing is not usually carried out, elimination of a final track carries out logic elimination of the information on the last track of a PMA area. By carrying out logic elimination of the information on a final track, a CD-RW recorder judges this CD-RW disk to be a thing without this final track, and can overwrite a new track now from

the starting position of this final track of a program area. By repeating final track elimination, one track is eliminable at a time from back.

[0003]

[Problem(s) to be Solved by the Invention]Disk identification information (Disc ID) besides the information about each track is recorded on the PMA area of a CD-RW disk. Disk identification information is the identification information for every one-sheet disk of one sheet. If it judges [that a CD-RW recorder reads the information on a PMA area, and has not recorded disk identification information, and] when a CD-RW disk is set in a CD-RW recorder, a CD-RW recorder will generate the disk identification information of arbitrary codes, and will write it in a PMA area. It is manageable with the host computer to which the information about each CD-RW disk is connected in the CD-RW recorder itself or this CD-RW recorder by using disk identification information. For example, when recording a CD-RW disk. acting before the audience is recorded on a program area -- it preceding and using the PCA area (Power Calibration Area) of the disk most inner circumference, Recording laser power is changed one by one at the speed (1X, 2X,, etc.) used for record of acting before the audience, trial writing is performed, and OPC control (Optimum Power Control) which asks for the recording laser power which reproduces this, and from which the best regenerative-signal characteristic is obtained is performed. And the initial value of recording laser power is set as this ** **** value, and acting before the audience is recorded. The initial value of this recording laser power is a value which can be used repeatedly, as long as it records on the same CD-RW disk with the same recording rate using the same CD-RW recorder.

[0004]Then, the result obtained by OPC control (parameters, such as a recording rate and a recording-laser-power initial value.) a following OPC parameter -- the disk identification information of this CD-RW disk -- the memory (EEPROM.) in a CD-RW recorder or a host computer When it saves at a flash memory, a hard disk, etc. and a CD-RW disk is set in a CD-RW recorder, When disk identification information is read in a PMA area and this disk identification information is memorized by this memory, an OPC parameter applicable from this memory can be acquired, a recording rate and the initial value of recording laser power can be set up automatically, and acting before the audience can be recorded. By using such a function (called OPC value MEMORAIZU etc.), Whenever it records by setting a CD-RW disk in a CD-RW recorder, the execution time of the OPC control made required can be saved (about 7 per time - 15 seconds), and waiting time until it starts record of acting before the audience can be shortened.

[0005]However, since disk identification information will be eliminated by elimination of a PMA area in the conventional erasing method, Even if the OPC parameter of the applicable CD-RW disk was saved in the memory of a CD-RW recorder or a host computer, could read this OPC parameter and it could not be used, but OPC control had to be redone.

[0006]This invention solves the problem in a Prior art mentioned above, The CD-RW recorder itself. Or so that information, including the OPC parameter about each CD-RW disk memorized by the host computer to which a CD-RW recorder is connected, etc., can be used even after erasing processing of this CD-RW disk is carried out. It is going to provide the CD-RW recorder which enforces the erasing method and this erasing method of the CD-RW disk carried out.

[0007]

[Means for Solving the Problem]An erasing method of a CD-RW disk of this invention, About a CD-RW disk with which a frame which has the information about a track recorded on a frame and a program area which have disk identification information in a proper part of a PMA area is recorded, respectively. A frame which has said disk identification information is saved in a proper part of a PMA area, and all the frames which have the information about said track of this PMA area are eliminated. A part where disk identification information is saved can be made into a head of a PMA area. Disk identification information can be saved at the section of ten frames equivalent to one unit section of a PMA area.

[0008]A frame on which an erasing method of CD-RW of this invention has disk identification information at the head of a PMA area is recorded, About a CD-RW disk with which a frame which has the information about a track recorded on a program area is recorded after this frame, a frame which has said disk identification information is saved as it is, and all the frames which have the information about said track are eliminated.

[0009]A frame on which an erasing method of CD-RW of this invention has disk identification information at the head of a PMA area is recorded, About a CD-RW disk with which a frame which has the information about a track recorded on a program area is recorded after this frame. A frame number is expanded, a frame which has said disk identification information is saved at the head of a PMA area, and all the frames which have the information about said track are eliminated.

[0010]A frame which has disk identification information is recorded on a part excluding [an erasing method of CD-RW of this invention] a head of a PMA area, About a CD-RW disk with which a frame which has the information about a track recorded on a program area is recorded on a part except a frame which has this disk identification information of this PMA area. A frame which has said disk identification information is written to a head of a PMA area, is moved, and is saved, and a frame of a basis which has all the frames and these disk identification information which have the information about said track is eliminated.

[0011]A frame to which an erasing method of CD-RW of this invention has the information about a track recorded on a program area in a PMA area is recorded in order of a track number, About a CD-RW disk with which a frame which has disk identification information following this frame is recorded. It writes, moves and saves on a frame which has the

information concerning a final track in a frame which has said disk identification information, and while eliminating information about this final track, a frame of a basis which has this disk identification information is eliminated.

[0012]A frame which has the information about a track which an erasing method of CD-RW of this invention recorded on a program area in a PMA area, Consider ten all as a part for one track in one unit section which divided these ten PMA areas at a time, or five frames is recorded at a time in order of a track number as a part for two tracks, About a CD-RW disk with which a frame which has the information about a final track, and five frames which have disk identification information are recorded at a time on the same unit section. A unit section where a frame which has the information about said final track, and a frame which has disk identification information are recorded all boils ten frames, said disk identification information is saved, and information about said final track is eliminated from this unit section.

[0013]A frame which has the information about a track which an erasing method of CD-RW of this invention recorded on a program area in a PMA area, Consider ten all as a part for one track in one unit section which divided these ten PMA areas at a time, or five frames is recorded at a time in order of a track number as a part for two tracks, A frame which has the information about a final track, and five frames which have the information about a track in front of the one [last] are recorded at a time on the same unit section, About a CD-RW disk with which a frame of a unit section following this unit section which has ten disk identification information in all is recorded. A frame which has said disk identification information is saved as it is, Information about a track in front of [of this last / all / ten frames] one of the unit sections where a frame for which it has the information about said final track, and a frame which has the information about a track in front of the one [last] are recorded is saved. Information about said final track is eliminated from this unit section.

[0014]According to the erasing method of a CD-RW disk of this invention, since disk identification information is saved in a PMA area, after erasing processing, Information about each CD-RW disks, such as an OPC parameter memorized by a CD-RW recorder or host computer, can be used even after erasing processing of this CD-RW disk is carried out.

[0015]There are some which always record a specific code (for example, oar 0) on a PMA area as disk identification information depending on a CD-RW recorder. Such a code does not have the function to identify each CD-RW disk. So, when disk identification information comprises a specific code, a frame which has this disk identification information can be replaced with carrying out said preservation, and can be eliminated. Or when disk identification information comprises a specific code, a frame which has this disk identification information can be transposed to a code of other disk identification information, and can be saved.

[0016]A PMA information detection means which a CD-RW recorder of this invention is a CD-RW recorder which can carry out record and elimination of a CD-RW disk, and detects

recorded information on a PMA area of a CD-RW disk, An instruction transmitting means which inputs a command signal which emits a command signal which orders it elimination of an entire disk of a CD-RW disk, or orders it elimination of an entire disk of a CD-RW disk from a host computer, A control means which performs record and erasing control of a CD-RW disk is provided, In the state where wearing of a CD-RW disk with which a frame which has the information about a track recorded on a frame and a program area which have disk identification information in a proper part of a PMA area based on detection information on said PMA information detection means is recorded, respectively is detected. When clear command of said entire disk is given, said control means saves a frame which has said disk identification information in a proper part of a PMA area, and performs control which eliminates all the frames which have the information about said track of this PMA area. According to this, when ordered in elimination of an entire disk, after erasing processing can save disk identification information in a PMA area.

[0017]A PMA information detection means which a CD-RW recorder of this invention is a CD-RW recorder which can carry out record and elimination of a CD-RW disk, and detects recorded information on a PMA area of a CD-RW disk, An instruction transmitting means which inputs a command signal which emits a command signal which orders it elimination of a final track of a CD-RW disk, or orders it elimination of a final track of a CD-RW disk from a host computer, A control means which performs record and erasing control of a CD-RW disk is provided, Based on detection information on said PMA information detection means, a frame which has the information about a track recorded on a program area is recorded on a PMA area in order of a track number, In the state where wearing of a CD-RW disk with which a frame which has disk identification information following this frame is recorded is detected. When clear command of said final track is given, said control means writes, moves and saves on a frame which has the information concerning a final track in a frame which has said disk identification information, While eliminating information about this final track, control which eliminates a frame of a basis which has this disk identification information is performed. According to this, when ordered in elimination of a final track, after erasing processing can save disk identification information in a PMA area.

[0018]

[Embodiment of the Invention] This embodiment of the invention is described below. The disc format of a CD-RW disk and Q sub-code format of a PMA area are explained first. Drawing 2 shows the disc format by the side of inner circumference from the lead-in groove field of a CD-RW disk. A lead-in groove field is adjoined and the PMA area is established in the inner circumference side. A PMA area is started from the 1000-frame this side of the starting position of a lead-in groove field, and the information on a track etc. is recorded per ten frames. The PCA area is established in the inner circumference side of a PMA area. The PCA

area comprises a count area and a test area. The execution frequency (a maximum of 100 times) of OPC operation is recorded on a count area. A test area is a field which performs trial writing by OPC operation.

[0019]An example of Q subcode data of a PMA area is shown in drawing 3. Data with PMA area same to the unit section which information is recorded per ten frames and comprises this 10 frame is recorded repeatedly. Or this 10 frame unit section can be divided into five frames in the first half five frames and the second half, and it can also record five different data at a time. The contents of Q subcode data are directed by ADR (address), and ADR=02 (PMA mode 2) means disk identification information. At this time, six digits which combined min, sec, and frame express disk identification information. psec expresses a disk type (kind of data format). namely, -- psec=00 expresses CD digital audio or CD-ROM, and psec=10 expresses CD-I (CD -- interactive) -- psec=20 -- CD-ROM [0020]XA is expressed. ADR=01 (PMA mode 1) means the TOC information of each track currently recorded on the program area. At this time, point expresses a tune number, min, sec, and frame express the end time of the tune number concerned, and pmin, psec, and pfrm express the time of onset of the tune number concerned. The PMA mode 2, i.e., disk identification information, is recorded on a PMA area only once (5 or ten frames). usually, when a CD-RW disk is set in a CD-RW recorder for the first time, ten unit sections of the head of a PMA area all boil disk identification information (PMA mode 2), and it is recorded (to or five frames of the first half of the unit section of this head). However, there are some which do not record disk identification information on a PMA area depending on a CD-RW recorder, When a CD-RW disk is first set in such a CD-RW recorder and a track is recorded, disk identification information will not be recorded on the head of a PMA area, but the TOC information (PMA mode 1) about the track will be recorded on it. If it sets in the CD-RW recorder which has a function which records disk identification information for the CD-RW disk recorded such after that, not having recorded disk identification information will be distinguished and disk identification information will be recorded after the record trailer of a PMA area at the time. Therefore, disk identification information (PMA mode 2) may be recorded in addition to the head of a PMA area. With some CD-RW recorder, a fixed value (for example, oar 0) may always be recorded as disk identification information as mentioned above.

[0021]drawing 4 shows the system configuration of CD-R / RW drive 10 (optical disk recording device in which record and playback of a CD-R (CD -- recordable) disk and a CD-RW disk are possible) to which this invention was applied. The optical discs (CD-R, CD-RW, etc.) 14 are driven with the spindle motor 16, and record and playback of information are performed by the optical pickup 18. The optical pickup 18 is transported to the diameter direction of the optical disc 14 with the feed motor 20 at the time of playback. As for the data of the optical disc 14 read by the optical pickup 18, EFM recovery, error correction processing, etc. are performed

by the EFM/CIRC encoder / decoder 24 via RF amplifier 22. It is temporarily stored in the buffer memory 28 via the memory control part 26, and it is read according to an internal reference clock, a jitter is absorbed, and the data to which it restored is sent to the host computer 12 via the interface part 30. The sub-code detector circuit 31 detects a sub-code from the data by which the EFM recovery was carried out. The sub-code of a PMA area is also detected here.

[0022]The record signal sent out from the host computer 12 at the time of record, It is temporarily stored in the buffer memory 28 via the interface part 30 and the memory control part 26, It is read according to the internal clock of CD-R / RW drive 10, and the sub-code generated in the sub-code generating circuit 33 is given (the sub-code of a PMA area is also generated here.), Eight-to-fourteen modulation and an error correcting code are given by the EFM/CIRC encoder and the decoder 24, the optical pickup 18 is driven via RF amplifier 22, and it is recorded on the optical disc 14. The servo control section 32 performs constant linear velocity control of the spindle motor 16, focus control of the optical pickup 18, tracking control, delivery control of the feed motor 20, etc. based on the output signal of RF amplifier 22. The system control part 34 controls each part in CD-R / RW drive 10 for performing these instructions based on the instructions from the host computer 12, etc.

[0023]Control by the system control part 34 is explained. Elimination means logic elimination by the following explanation. Drawing 5 shows the control procedure of a disk check performed automatically, when the optical disc 14 is set. Detection of that the optical disc 14 was set will perform disk check operation (S11). (S10) Here, a disk kind (a CD-R disk or a CD-RW disk) is distinguished from the ATIP special information on a lead-in groove field. All the data currently recorded on the lead-in groove field and the PMA area is read.

[0024]After a disk check is completed, various operations of record, reproduction, elimination, etc. are attained based on instructions of the user from the host computer 12. The control procedure by the system control part 34 in case the clear command of an entire disk has been sent from the host computer 12 is shown in drawing 1. If ordered in elimination of an entire disk, it will be judged whether disk identification information is first included in PMA information (S20). When disk identification information is not included, all of a PMA area and a lead-in groove field are eliminated (S21), and erasing control is ended (S22). When disk identification information is included in PMA information, it is judged whether in ten heads of a PMA area, this disk identification information is recorded on all (S23). When ten heads are recorded on all, these ten heads leave all as it is, without attaching any hands (saving), all of the remaining PMA areas and lead-in groove fields are eliminated (S24), and erasing control is ended (S (elimination beyond it becomes impossible) 25). When disk identification information is not recorded on all in ten heads of a PMA area (when not recorded on ten heads at all, or when being recorded only on five of ten heads of the first half or the second half) Q sub-code of

these ten whole heads. As the PMA mode 2 (ADR=02), these ten heads write and move disk identification information to all, all of the remaining PMA areas and lead-in groove fields are eliminated (S26), and erasing control is ended (S(elimination beyond it becomes impossible) 27).

[0025]The example of the erasing operation by the erasing control of the entire disk of drawing 1 is shown in drawing 6 - drawing 8. In drawing 6 - drawing 8, (i) is in the state before elimination and (ii) is in the state after elimination. As for "ID", the frame section when disk identification information (PMA mode 2) was recorded on Q sub-code, "T1", "T2", and "T3" are each frame section when the TOC information (PMA mode 1) about the tracks 1, 2, and 3 was recorded on Q sub-code. Drawing 6 (i) by the case where disk identification information is recorded on ten heads of a PMA area, and the TOC information of the tracks 1, 2, and 3 is recorded after that. If it is ordered elimination of an entire disk, as shown in (ii), a top unit section will be left behind as it is, and, as for a PMA area, all of the remaining PMA areas and lead-in groove fields will be eliminated. Drawing 7 (i) by the case where disk identification information and the TOC information of the track 1 are recorded five frames at a time on the unit section of the head of a PMA area, and the TOC information of the tracks 2 and 3 is recorded after that. If it is ordered elimination of an entire disk, as shown in (ii), disk identification information will be overwritten by the whole top unit section, and all of the remaining PMA areas and lead-in groove fields will be eliminated. When it is ordered [drawing 8 (i)] elimination of an entire disk by the case where disk identification information is recorded in the middle of the PMA area, as it shows (ii), disk identification information is overwritten by the whole top unit section, and all of the remaining PMA areas and lead-in groove fields are eliminated.

[0026]Next, the control procedure by the system control part 34 in case the clear command of a final track has been sent from the host computer 12 is shown in drawing 9. if ordered in elimination of a final track, it will be judged whether the TOC information about a track is first recorded on the PMA area (S30). (namely, -- do blank disk or not?) When it is a blank disk, the erasing control beyond it is ended (S41). When it judges whether FAINA rise processing is carried out when it is not a blank disk by the existence of lead-in groove information (S31) and FAINA rise processing is carried out, only elimination of an entire disk shall be performed here and erasing control is ended (S41). Even if it is a case where FAINA rise processing is carried out, elimination of a final track can be performed by what (logic elimination of the lead-in groove field is carried out) a FAINA rise state is canceled for.

[0027]It is judged whether when FAINA rise processing is not carried out, the TOC information of the final track is recorded five frames at a time on the unit section of ten frames of the same PMA area as disk identification information (S32), When recorded on the same unit section as disk identification information, disk identification information is written and moved to these all

ten frames by making this 10 frame whole unit section into the PMA mode 2 (ADR=02) (S33). A final track is eliminated now. When the TOC information of the final track is recorded on the unit section different from disk identification information, When the TOC information of the final track is recorded on the inner circumference side (near side) rather than disk identification information, or it is recorded on the periphery side (backside), and ** is judged (S34) and it is recorded on the inner circumference side, It is judged whether five frames is recorded at a time on the unit section of ten frames of the PMA area where the TOC information of a final track and the TOC information of the track of the one this side are still the more nearly same (S35), When recorded on the same unit section, the TOC information of the track before [one] this final track is written and moved to these all ten frames by making this 10 frame whole unit section into the PMA mode 1 (ADR=01) (S36). A final track is eliminated now. At this time, the unit section where disk identification information is recorded is left behind as it is. When the TOC information of a track and the TOC information of the track of the one this side are not recorded on the same unit section, disk identification information is written and moved to these all ten frames by making into the PMA mode 2 (ADR=02) the whole unit section where the TOC information of the final track is recorded (S37). A final track is eliminated now. At this time, the unit section of a basis where disk identification information was recorded is eliminated.

[0028]When the TOC information of the final track is recorded on the unit section after disk identification information, Five frames is recorded at a time on the unit section of ten frames of the PMA area where the TOC information of a final track and the TOC information of the track of the one this side are still the more nearly same, or it is judged how it is (S38), When recorded on the same unit section, the TOC information of the track before [one] a final track is written and moved to this ten frame of the whole by making this whole unit section into the PMA mode 1 (ADR=01) (S39). A final track is eliminated now. When the TOC information of a final track and the TOC information of the track of the one this side are recorded on the separate unit section, the whole unit section where the TOC information of the final track is recorded is eliminated (S40). A final track is eliminated now. If a final track is eliminated, the track of the one this side will turn into a new final track. Therefore, elimination of a final track is repeatable by the erasing control mentioned above by giving the clear command of a final track further. If all the tracks are eliminated, the erasing operation beyond it (elimination of an entire disk, elimination of a final track) will become impossible (that is, it is judged as a blank disk at Step S30, and results in Step S41.), and disk identification information will be left behind to ten heads of a PMA area.

[0029]The example of the erasing operation by the erasing control of the final track of drawing 9 is shown in drawing 10 - drawing 14. In drawing 10 - drawing 14, (i) is in the state before elimination and (ii) is in the state after elimination. The frame section when disk identification

information (PMA mode 2) was recorded on Q sub-code as for "ID", "Te", "Te-1", and "Te-2" are each frame section when the TOC information (PMA mode 1) about a final track, the track in front of the one [last], and the track in front of the two [last] was recorded on Q sub-code. Drawing 10 (i) is a case where the TOC information of the final track is recorded on the one whole unit section by the side of a periphery rather than the unit section where disk identification information is recorded. Instructions of elimination of a final track will eliminate the unit section which recorded the TOC information of the final track as shown in (ii) (equivalent to Step S40 of drawing 9). Drawing 11 (i) is a case where the TOC information of a final track and the track in front of the one [last] is recorded five frames at a time on one unit section by the side of a periphery rather than the unit section where disk identification information is recorded. If it is ordered elimination of a final track, as shown in (ii), the TOC information of the track in front of the one [last] will be overwritten by the whole unit section, and the TOC information of a final track will be eliminated in connection with this (equivalent to Step S39 of drawing 9). Drawing 12 (i) is a case where the TOC information and disk identification information of the final track are recorded five frames at a time on the same unit section. If it is ordered elimination of a final track, as shown in (ii), disk identification information will be overwritten by the whole unit section, and the TOC information of a final track will be eliminated in connection with this (equivalent to Step S33 of drawing 9).

[0030] Drawing 13 (i) is a case where the TOC information of the final track is recorded on the one whole unit section which adjoins the inner circumference side of the unit section where disk identification information is recorded. If it is ordered elimination of a final track, as shown in (ii), disk identification information will be overwritten by the one whole unit section where TOC of the final track is recorded, and the TOC information of a final track will be eliminated in connection with this. The whole unit section of a basis where disk identification information was recorded is eliminated (equivalent to Step S37 of drawing 9). Drawing 14 (i) is a case where the TOC information of a final track and the track in front of the one [last] is recorded five frames at a time on one unit section which adjoins the inner circumference side of the unit section where disk identification information is recorded. If it is ordered elimination of a final track, as shown in (ii), the TOC information of the track in front of the one [last] will be overwritten by the whole unit section, and the TOC information of a final track will be eliminated in connection with this. At this time, the unit section where disk identification information is recorded is left behind as it is (equivalent to Step S36 of drawing 9).

[0031] Drawing 15 - drawing 17 are operations at the time of repeating the erasing operation by the erasing control of the final track of drawing 9. In drawing 15 - drawing 17, (i) is in the state before elimination. Disk identification information is recorded on the whole unit section of 1 of the head of a PMA area, and drawing 15 (i) are (ID) and a case where the TOC information of the tracks 1, 2, 3, 4, and 5 is recorded after that (T1, T2, T3, T4, T5). (ii) from which the track 5

will be eliminated if it is ordered final track elimination. If instructions of final track elimination are furthermore repeated, the tracks 4, 3, 2, and 1 will be eliminated one by one (iii, iv, v, vi), and, finally disk identification information will be left behind. Drawing 16 (i) is a case where disk identification information is recorded on the unit section in the middle of a PMA area, and the TOC information of the tracks 1, 2, 3, 4, and 5 is recorded before and after that. (ii) from which the track 5 will be eliminated if it is ordered final track elimination. If instructions of final track elimination are furthermore repeated, the tracks 4 and 3 will be eliminated (iii, iv). (iv) from which disk identification information is written and moved to the unit section where the TOC information of the track T2 was recorded when it was furthermore ordered final track elimination, and disk identification information is written and moved to (v) and the unit section where the TOC information of the track T1 was recorded when it was further ordered final track elimination. Drawing 17 (i) is a case where disk identification information and the TOC information of the track 1 are recorded five frames at a time on the unit section of the head of a PMA area, and the TOC information of the track 2 is recorded after that. (ii) from which the track 2 will be eliminated if it is ordered elimination of a final track. (iii) which disk identification information will write to ten frame of the whole of a head, and will be moved to it if it is furthermore ordered elimination of a final track.

[0032]By the way, with some CD-RW recorder, a fixed value (for example, oar 0) may always be recorded as disk identification information as mentioned above. Such disk identification information does not have a function as identification information. Then, CD-R / RW drive 10 of drawing 4 perform special processing, when the CD-RW disk with which such specific disk identification information is recorded is set. The contents of the processing are explained. The oar 0 is beforehand memorized as disk identification information which does not have an identifying function by the memories (EEPROM, a flash memory, etc.) of CD-R / RW drive 10. The example of erasing operation when the CD-RW disk with which applicable disk identification information was recorded is set is shown in drawing 18. (i) It is in the state before elimination, and the oar 0 is recorded on the unit section of the head of a PMA area as disk identification information, and the TOC information of the tracks 1, 2, 3, 4, and 5 is recorded after that. If the tracks 5, 4, 3, and 2 are eliminated one by one (iiii, iv, v) and eliminate the track 1 whenever it gives the clear command of a final track, (vi) with which the disk identification information (ID=0) of the unit section of the head of a PMA area is overwritten by the disk identification information (ID!=0) of other codes in which disk discernment is possible, and is replaced. Or it can replace with this replacement and the disk identification information (ID=0) of the unit section of the head of a PMA area can also be eliminated (vi'). Or when the CD-RW disk with which such specific disk identification information (ID=0) was recorded is set, this disk identification information (ID=0) can also be overwritten by other disk identification information (ID!=0) in which disk discernment is possible (ii').

[0033]The OPC control and OPC value MEMORAIZU control by the system configuration of drawing 4 are explained. If the optical disc (CD-RW disk) 14 is set to CD-R / RW drive 10, OPC control will be performed with the specified recording rate which is used by record of acting before the audience by the instructions from the host computer 12. If optimum recording power is called for by this OPC control, when disk identification information has not been recorded, CD-R / RW drive 10 will generate arbitrary disk identification information, and will record on the PMA area of the CD-RW disk 14 by this record power. The host computer 12 acquires the information which combined the OPC parameter, i.e., disk identification information, the recording rate, and the value of optimum recording power that was calculated as for the account of the upper from CD-R / RW drive 10 by a command, It stores in internal memories (EEPROM, a flash memory, a hard disk, etc.). CD-R / RW drive 10 sets record power as the optimum recording power for which the account of the upper was able to ask, and records acting before the audience with the above-mentioned recording rate. If record of acting before the audience is completed, the CD-RW disk 14 will be removed from CD-R / RW drive 10. Thereby, CD-R / RW drive 10 eliminates the above-mentioned OPC parameter from an internal memory (RAM).

[0034]Then, if this CD-RW disk 14 is again set to CD-R / RW drive 10, CD-R / RW drive 10 will read disk identification information in the PMA area of the CD-RW disk 14, and will transmit it to the host computer 12. It is searched whether in response, the host computer 12 has the disk identification information applicable to internal memories (EEPROM, a flash memory, a hard disk, etc.). If applicable disk identification information is found, the information on the recording rate memorized about the disk identification information and optimum recording power will be transmitted to CD-R / RW drive 10. CD-R / RW drive 10 is set to the value to which the initial value of a recording rate and record power was this transmitted, respectively, and starts record of acting before the audience. By the temperature change of a disc substrate, etc., since optimum recording power is changed, after a recording start performs real-time OPC control which tunes record power finely based on the returned light detected wave of the laser beam for record.

[0035]In order to perform the above-mentioned OPC control and OPC value MEMORAIZU control, an example of the algorithm set to the host computer 12 side is shown in drawing 19. Detection of the set of the optical disc 14 of CD-R / RW drive 10 will transmit this detection information to the host computer 12 (S50). In response, the host computer 12 requires transmission of disk identification information and other required information of CD-R / RW drive 10 (S51). It is judged whether disk identification information is included in the information transmitted from CD-R / RW drive 10 (S52), It is judged whether when contained, the inside of the memories (EEPROM, a flash memory, a hard disk, etc.) in the host computer 12 is searched (S53), and there is any applicable disk identification information (S54). When there is

applicable disk identification information, the information on the recording rate memorized about this disk identification information and optimum recording power is transmitted to CD-R / RW drive 10 (S55). Thereby, CD-R / RW drive 10 can record acting before the audience using this information.

[0036]When the disk identification information in which disk identification information was not included and which case [disk identification information] or corresponds does not exist, CD-R / RW drive 10 is ordered record of disk identification information, and execution of OPC control (S56). If OPC control is completed, transmission of the OPC parameter (information which combined disk identification information, a recording rate, and optimum recording power) obtained by OPC control will be required (S57). If an OPC parameter is transmitted, this is saved at internal memories (EEPROM, a flash memory, a hard disk, etc.) (S58). CD-R / RW drive 10 records acting before the audience using the OPC parameter obtained by OPC control.

[0037]Although the above-mentioned embodiment explained the case where it applied to the CD-RW recorder which uses this invention for a host computer connecting, A CD-RW recorder used alone without connecting with a host computer. It is applicable to (for example, the CD-RW recorder which can possess an audio CD recorder, i.e., a digital input terminal, or an analog input terminal, can record the audio signal inputted from this input terminal on a CD-R disk or a CD-RW disk, and can be played). In this case, the deletion button provided in this CD-RW recorder corresponds to the instruction transmitting means in this invention. Information peculiar to disks, such as an OPC parameter, is memorized by EEPROM in a CD-RW recorder, the flash memory, etc.

[Translation done.]

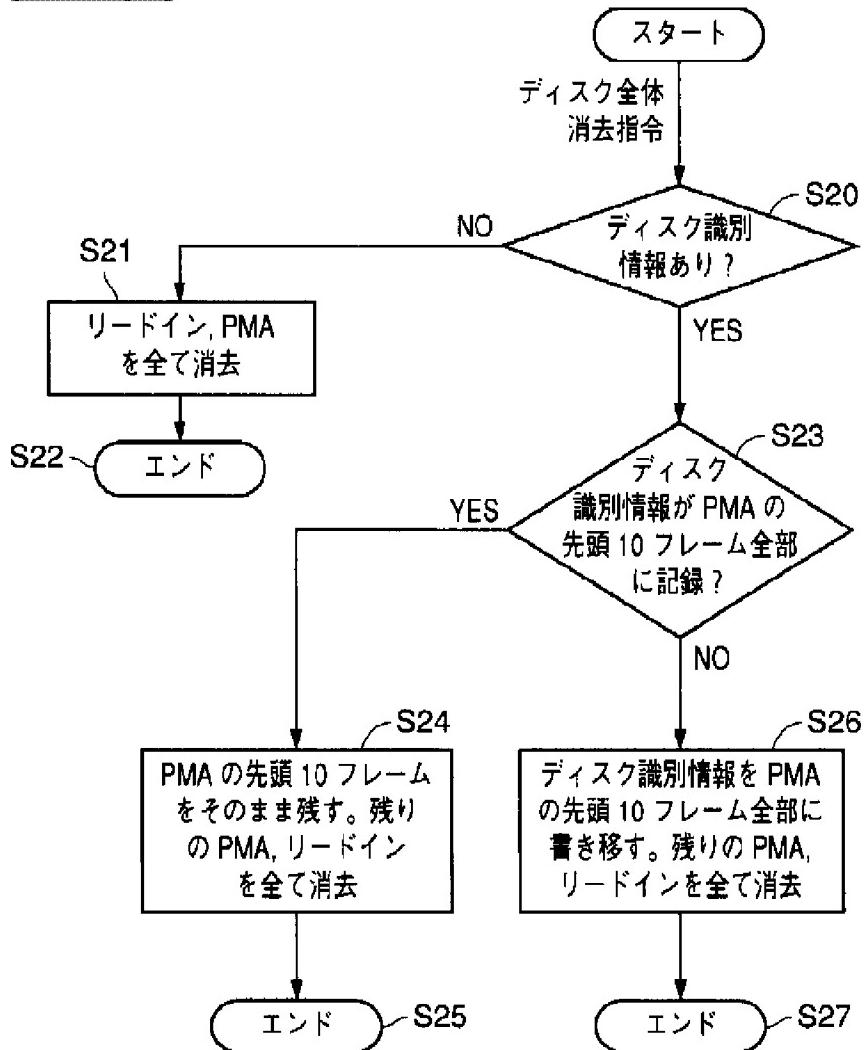
* NOTICES *

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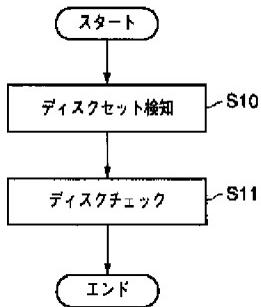
1. This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
3. In the drawings, any words are not translated.

DRAWINGS

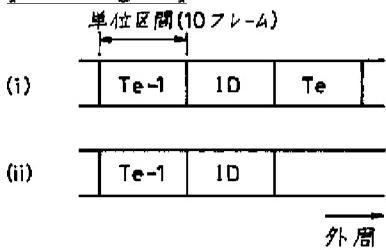
[Drawing 1]



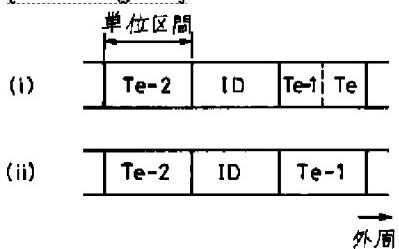
[Drawing 5]



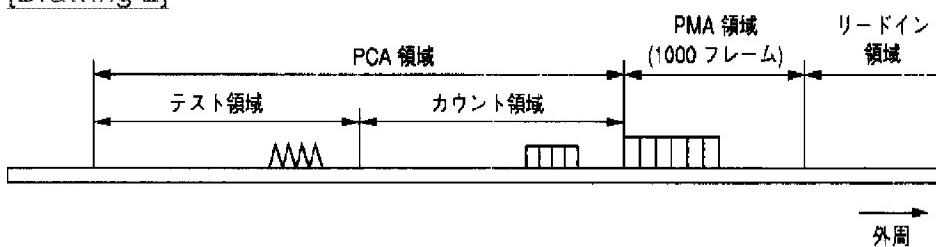
[Drawing 10]



[Drawing 11]



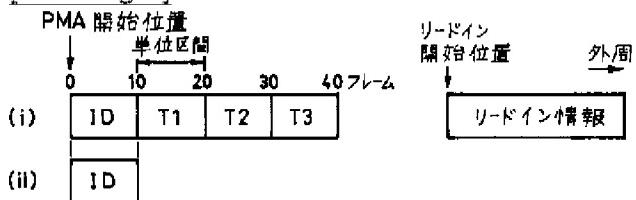
[Drawing 2]



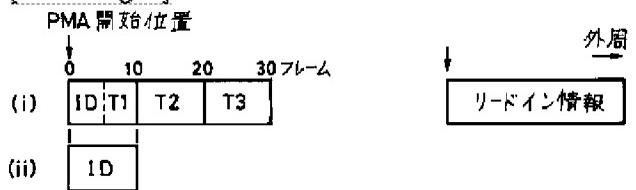
[Drawing 3]

フレーム番号	ADR	TNO	point	reserved			ディスクID		ディスクタイプ			reserved	reserved
				min	sec	frame	zero	pmin	psec	pfrm			
1	02	00	00	20	15	14	00	00	00	00	00	ID	reserved
2	02	00	00	20	15	14	01	00	00	00	00		
3	02	00	00	20	15	14	02	00	00	00	00		
4	02	00	00	20	15	14	03	00	00	00	00		
5	02	00	00	20	15	14	04	00	00	00	00		
6	02	00	00	20	15	14	05	00	00	00	00		
7	02	00	00	20	15	14	06	00	00	00	00		
8	02	00	00	20	15	14	07	00	00	00	00		
9	02	00	00	20	15	14	08	00	00	00	00		
10	02	00	00	20	15	14	09	00	00	00	00		
11	01	00	01	05	45	67	00	00	02	01		TOC	曲番
12	01	00	01	05	45	67	01	00	02	01			
13	01	00	01	05	45	67	02	00	02	01			
14	01	00	01	05	45	67	03	00	02	01			
15	01	00	01	05	45	67	04	00	02	01			
16	01	00	02	12	01	09	05	05	45	67			
17	01	00	02	12	01	09	06	05	45	67			
18	01	00	02	12	01	09	07	05	45	67			
19	01	00	02	12	01	09	08	05	45	67			
20	01	00	02	12	01	09	09	05	45	67			
21	01	00	03	30	17	42	00	12	04	09		曲番	曲番
22	01	00	03	30	17	42	01	12	04	09			
23	01	00	03	30	17	42	02	12	04	09			
24	01	00	03	30	17	42	03	12	04	09			
25	01	00	03	30	17	42	04	12	04	09			
26	01	00	04	37	50	18	05	30	19	52			
27	01	00	04	37	50	18	06	30	19	52			
28	01	00	04	37	50	18	07	30	19	52			
29	01	00	04	37	50	18	08	30	19	52			
30	01	00	04	37	50	18	09	30	19	52			
31	unrecorded			終了時間			10 フレーム単位で繰り返し			開始時間			

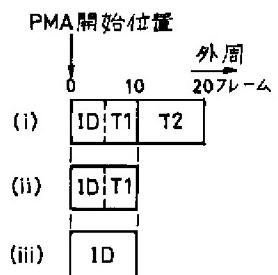
[Drawing 6]



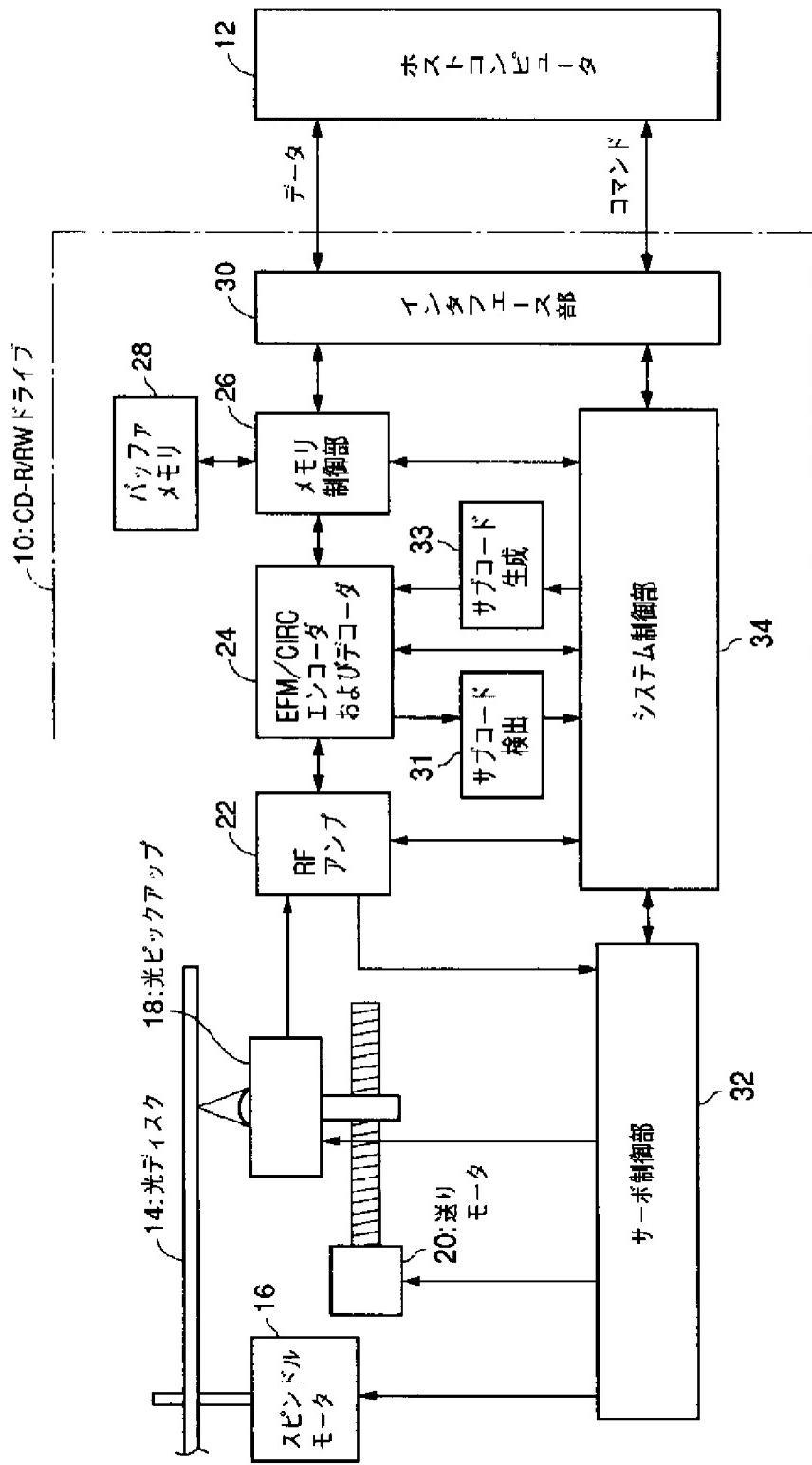
[Drawing 7]



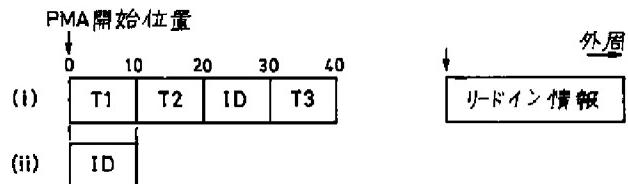
[Drawing 17]



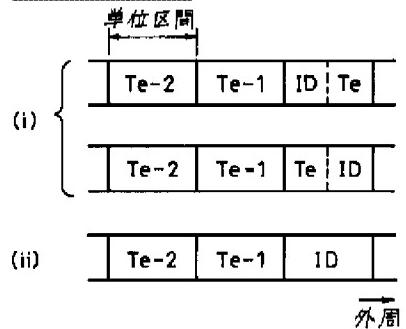
[Drawing 4]



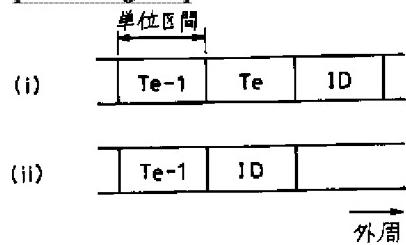
[Drawing 8]



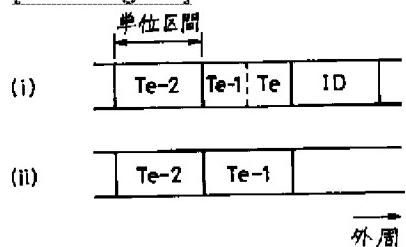
[Drawing 12]



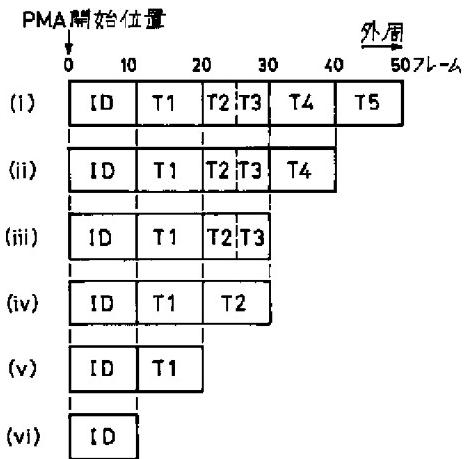
[Drawing 13]



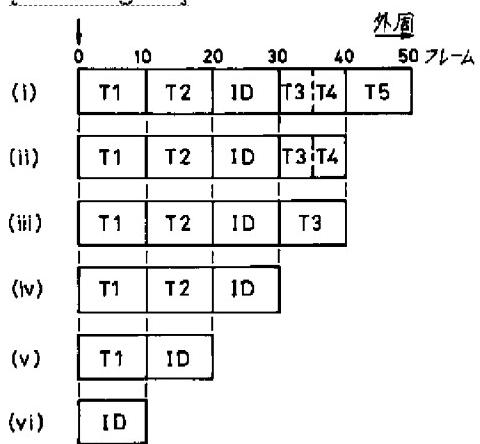
[Drawing 14]



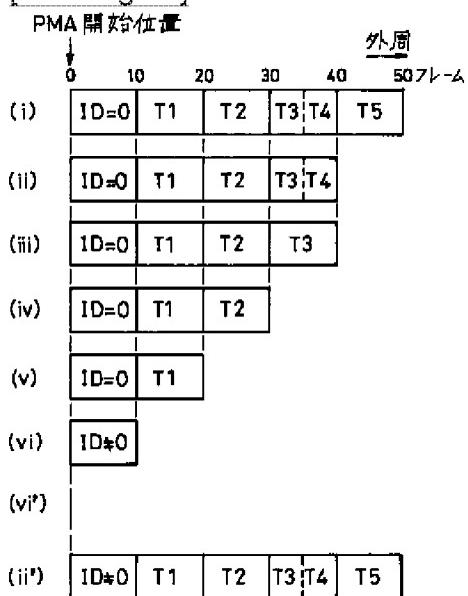
[Drawing 15]



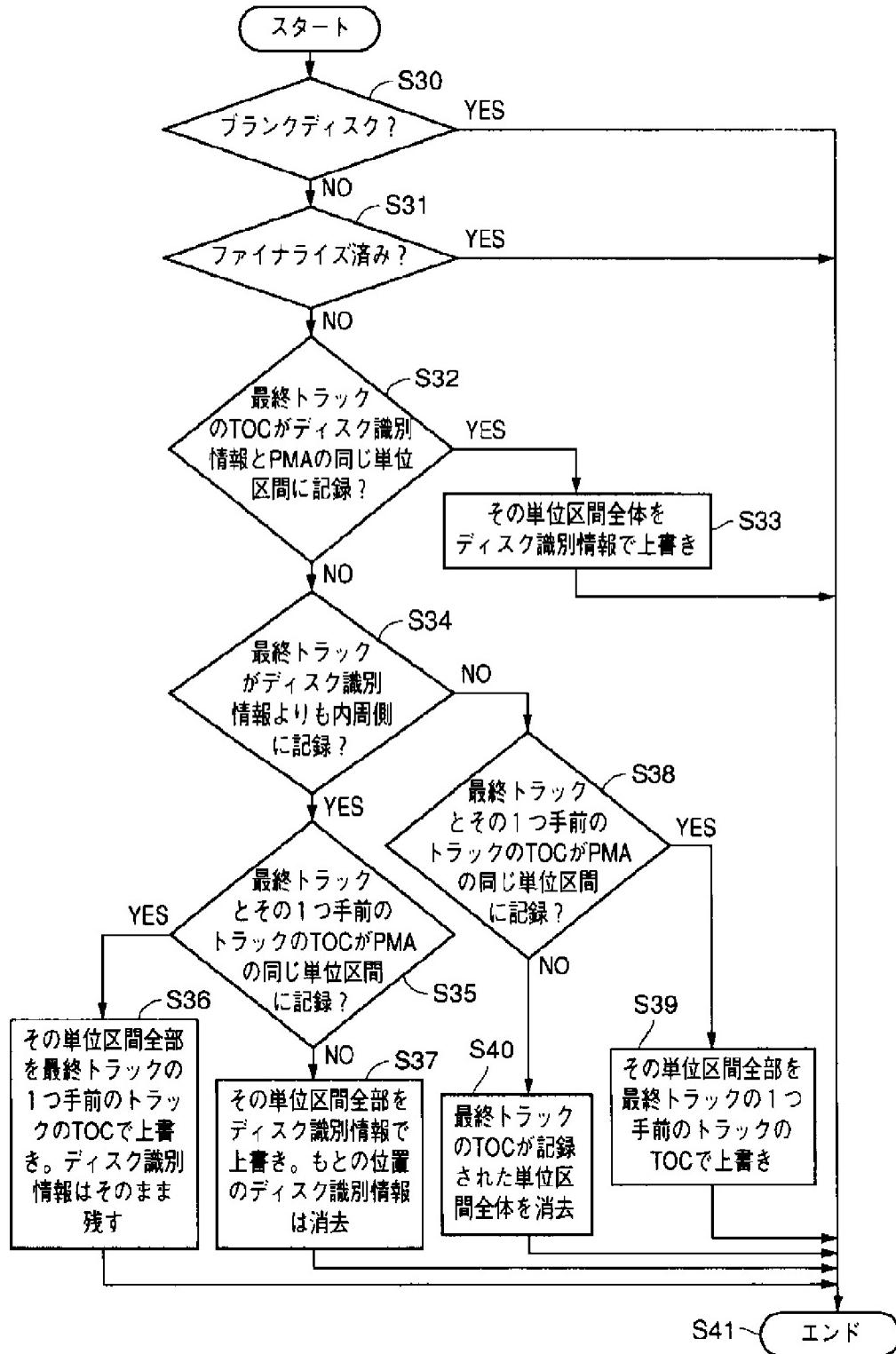
[Drawing 16]



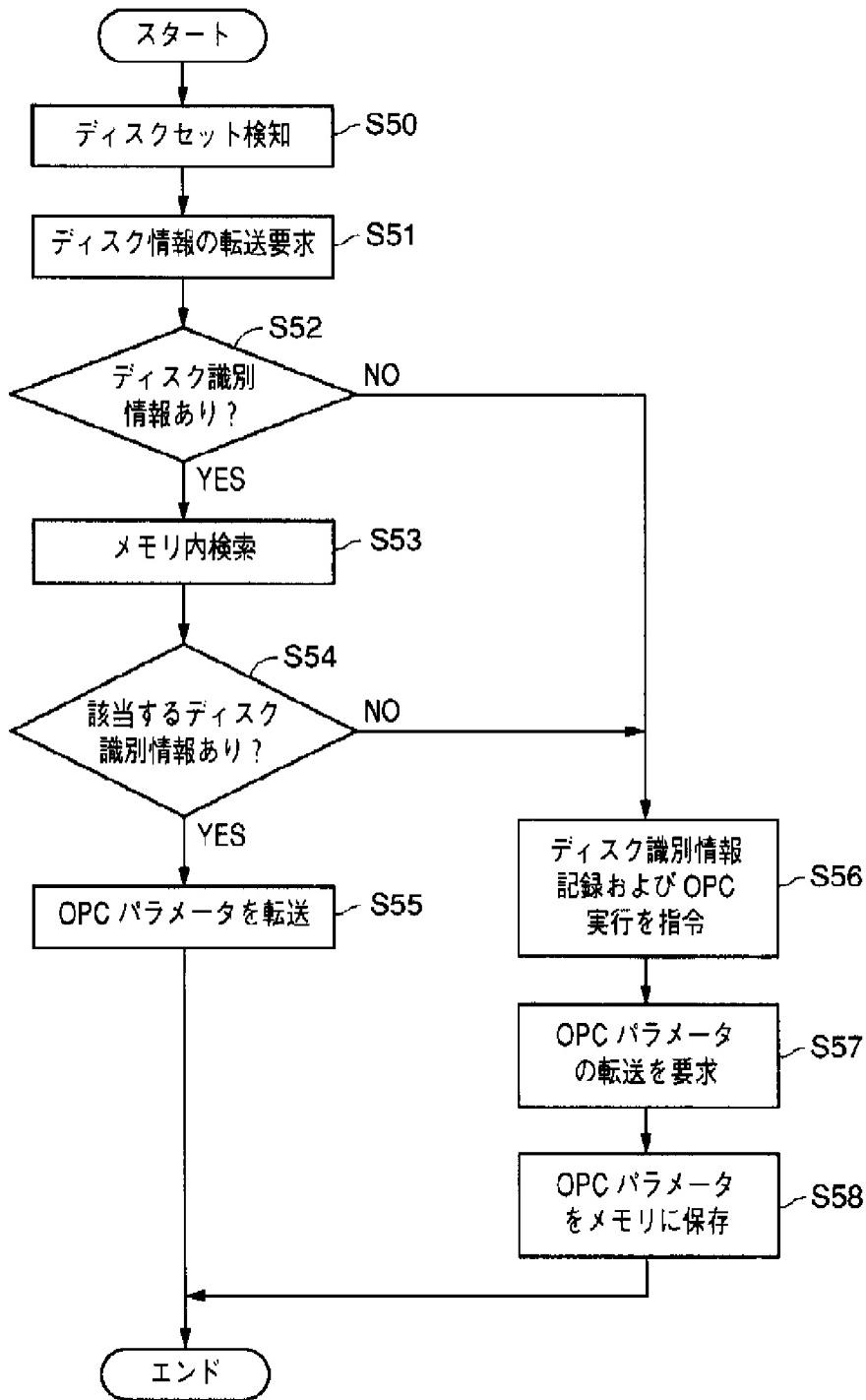
[Drawing 18]



[Drawing 9]



[Drawing 19]



[Translation done.]